BCR
Solid Solutions

| File No. | TITLE | Serial No./ Filing Date | Scope of Coverage | Relationship to BCR products/services |
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| 11556-007 | Reactor for Production of Chlorine Dioxide, Methods of Production of Same, and Related Systems and Methods of Using the Reactor | 61/267,142/ 12/7/2009 | Covers an improved chlorine dioxide generating system for dosing a target water-containing flowstream. The system includes an acidifying agent source; a sodium chlorite source; and at least one reactor having a reactor volume. The reactor is in fluid communication with the target water-containing flowstream so as to deliver ClO2 to the water-containing flowstream in such a manner to achieve a target $ClO_2$ concentration according to specified formula: $(C_1)(F_1)/F_2 = C_2$ F1 = $V_R/Contact_t$ F2 = stream flow C1 = concentration of ClO2 in reactor C2 = target ClO2 concentration $Contact_t$ represents contact time between acidifying agent and sodium chlorite being adjusted to occur between 0.5-25 minutes, and $V_R$ represents volume of the reactor. | Improved reactor design which allows for more efficient conversion of chlorite to chlorine dioxide. Most applicable to Class B, plug-flow Class A, and effluent disinfection applications. |

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| 11586-002 | Reactor for Production of Chlorine Dioxide, Methods of Production of Same, and Related Systems, and Methods of Using the Reactor. | 7,452,511<br>11/18/2008<br>10/430,460<br>5/5/2003 | Covers a reactor for generating chlorine dioxide. The reactor has a reaction chamber defined by walls of a first piece and a second piece. The first piece has a threaded portion, and the second piece has a matingly threaded portion configured to couple to the threaded portion of the first piece, wherein the threaded portions of the first and second pieces are configured to adjust an interior volume of the reaction chamber by allowing adjustable positioning of said second piece within the threaded portion of the first piece. The reacor also has a first inlet configured to accept a first reactant; a second inlet configured to accept a second reactant; and an outlet. The outlet, the first inlet, and the second inlet each communicate with the reaction chamber, wherein the first piece and the second piece are made of chemically resistant plastic, and at least a portion of the reactor is configured to be positioned within a pipe into which chlorine dioxide is to be released. | Original Generator patent. This is required for the generation of chlorine dioxide using BCR's 2-part generation method. |

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| 11586-003 | Chlorine Dioxide Generation | 61/173,442<br>4/28/2009 | A two chemical conversion method for preparing chlorine dioxide, comprising: reacting a 7.5-25 weight % aqueous sodium chlorite solution with a 55-75 weight % aqueous sulfuric acid in a reaction chamber sized to allow the aqueous sodium chlorite solution and the aqueous sulfuric acid to react for about 5 seconds to about 300 seconds to form a reaction mixture comprising chlorine dioxide in which 75% or more chlorite ion in the sodium chlorite solution is converted to chlorine dioxide. | Expanded version of the original patent to enhance patent protection. This application also allows for filing PCT applications. |
| 11586-004PCT | Methods and Systems for Improved Dosing of a Chemical Treatment, Such as Chlorine Dioxide, into a Fluid Stream, Such as a Wastewater Stream | PCT/US04/24185<br>7/28/2004 | Covers methods and systems to control the level of addition of a chemical treatment to a main flow of a fluid wastestream being treated thereby, for a particular purpose. The method involves forminga side stream from the main flow at a diverting point; determining the flow rate of the main flow; and adding the chemical treatment at a first addition point of the side stream, at a level of addition based principally on proportionality to the wastestream's main flow flow rate. The method further involves measuring, at a first measuring point downstream from the first addition point, the concentration of the chemical treatment in the side stream; adding the chemical treatment at a second addition point of the side stream, at a level of | Required for precise dosing of chlorine dioxide in effluent disinfection. Applicapable to other disinfectants (such as chlorine) to automate dosing. |
| 11586-004 | Methods and Systems for Improved Dosing of a Chemical Treatment, Such as Chlorine Dioxide, into a Fluid Stream, Such as a Wastewater Stream | 6,949,196<br>9/27/2005<br>10/628,871<br>7/28/2003 | | |
| 11586-004MX | Methods and Systems for Improved Dosing of a Chemical Treatment, Such as Chlorine Dioxide, into a Fluid Stream, Such as a Wastewater Stream | 258383<br>7/2/2008<br>PA/A/2005/001189<br>7/28/2004 | | |

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| 11586-004CA | Methods and Systems for Improved Dosing of a Chemical Treatment, Such as Chlorine Dioxide, into a Fluid Stream, Such as a Wastewater Stream | 2,534,040<br>7/28/2004 | addition based principally on the difference between the level of addition at the first addition point and the concentration measured and returning the side stream tot he main flow of the wastestream downstream of the diverting point. | |
| 11586-005 | Chlorine Dioxide Generation Method | 7,407,642<br>8/5/2008<br>11/372,464<br>3/10/2006 | Covers a two chemical conversion method for preparing chlorine dioxide. The method involves reacting a 7.5-25 weight % aqueous sodium chlorite solution with a 20-50 weight % aqueous sulfuric acid as sole constituents in a reaction chamber sized to allow the aqueous sodium chlorite solution and the aqueous sulfuric acid to react for about 5 seconds to about 300 seconds to form a reaction mixture comprising chlorine dioxide. 75% or more and 85% or less of chlorite ion in the sodium chlorite solution is converted to chlorine dioxide. | This is the basis for BCR's efficient, low cost chlorine dioxide generation method using sodium chlorite and sulfuric acid. US issued only. |
| 11586-006 | Sludge Treatment Process | 7,279,099<br>10/9/2007<br>11/141,273<br>6/1/2005 | Covers a method of treating biosolids, comprising: adding chlorine dioxide to the biosolids; ceasing the addition of chlorine dioxide when the biosolids reaches an oxidation-reduction potential of from about +200 mv to about +600 mv; adjusting the pH of the biosolids; and producing and maintaining a non-charged state of a chemical species capable of penetrating the shell of Ascaris eggs, the method producing a reduction in vector attraction of the biosolids. | Provides patent protection for the 'Neutralizer' process |

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| 11586-006BR | Sludge Treatment Process | 0511774-7 | See summary above for U.S. Patent for this family | Provides patent protection for the 'Neutralizer' process |
| 11586-006CA | Sludge Treatment Process | 2,569,076<br>6/1/2005 | | |
| 11586-006CN | Sludge Treatment Process | 200580026125.0<br>6/1/2005 | | |
| 11586-006EP | Sludge Treatment Process | 05 756 186.2<br>6/1/2005 | | |
| 11586-006HK | Sludge Treatment Process | 07110529.2<br>6/1/2005 | | |
| 11586-006IL | Sludge Treatment Process | 179779<br>6/1/2005 | | |
| 11586-006IN | Sludge Treatment Process | 7267/DELNP/2006<br>6/1/2005 | | |
| 11586-006JP | Sludge Treatment Process | 2007-515513<br>6/1/2005 | | |
| 11556-006MX | Sludge Treatment Process | PA/a/2006/013982<br>6/1/2005 | | |
| 11586-006PCT | Sludge Treatment Process | PCT/US05/19174<br>6/1/2005 | | |